Dogger Bank C/Sofia Onshore Works Application

Town and Country Planning Application

Flood Risk Assessment

On behalf of **Dogger Bank Wind Farms and Sofia**

Project Ref: 46941/4004 | Rev: B | Date: June 2020

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Date: **June 2020**

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For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved
A	23.06.20	Amendments following client comments	SK	RG	RG
B	30.06.20	Amendments following client comments	SK	RG	RG

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Executive Summary

This Flood Risk Assessment (FRA), has been prepared by Stantec UK Ltd, to support a Planning Application under the Town and Country Planning Act (TCPA) 1990 for the partial realignment of the onshore element associated with Dogger Bank Wind Farm C (DB-C) and Sofia Offshore Wind Farm (Sofia).

In accordance with the fundamental objectives of the National Planning Policy Framework (NPPF), this report demonstrates that:

(i) The development is safe;

(ii) The development does not increase flood risk; and,

(iii) The development does not detrimentally affect third parties.

The Environment Agency (EA) Flood Map for Planning confirms the Works are located within Flood Zone 1 (''Low' probability of flooding from rivers or the sea).

The planning application boundary is not identified as being subject to historic flooding, and is typically at 'very low' risk of surface water flooding. Ground conditions suggest the planning application boundary is at low risk of groundwater flooding. The Works within Wilton International are identified as being at risk of flooding in the event of a reservoir breach, but the risk of such an occurrence is considered negligible.

The Works are categorised as 'Essential Infrastructure' and in accordance with PPG Table 3, the Flood Risk and Flood Zone Compatibility table, the development is considered appropriate for Flood Zone 1. The Sequential Test and Exception Test are not applicable.

The nature of the Works and low level of flood risk means that there is no specific requirement for bespoke mitigation measures to be implemented to manage flood risk to the cable corridor works or in terms of the potential impact of these works on flood risk elsewhere.

It is noted that works at the watercourses to install the cable corridor have the potential to temporarily affect the function of the watercourse and conveyance of water. Access crossings are likely to require Land Drainage Consent for the completion of these work in due course from RCBC, as the LLFA.

All watercourses are planned to be crossed using trenchless techniques such as Horizontal Directional Drilling (HDD), there is no anticipated impact on the watercourse and no further mitigation will be required.

Temporary management of surface water runoff will be required during the works. The Code of Construction Practice and Construction Environmental Management Plan, which are required under the existing approved 2015 Development Consent Order (DCO), will set out the drainage measures to be implemented.

In summary, the report demonstrates that the Works are safe and in accordance with the requirements of relevant national and local planning policy.

1 Introduction

1.1 Scope of Report

1.1.1 Stantec were commissioned by Sofia Offshore Wind Farm Limited (SOWFL) and Dogger Bank C Wind Farm Project 3 Projco (the Projco) to provide hydrological and drainage services to support a Planning Application under the TCPA for the partial realignment of the onshore element associated with DB-C and Sofia Offshore Wind Farm (hereafter referred to as "Sofia").

1.1.2 A Development Consent Order (2015 DCO) was granted for Dogger Bank C Wind Farm (previously known as Dogger Bank Teesside A Offshore Wind Farm) and Sofia Offshore Wind Farm (previously known as Dogger Bank Teesside B Offshore Wind Farm) (the Applicants' Projects), including the onshore transmission works required to export electricity to the grid in August 2015

1.1.3 The Application includes five areas of alternative or supplementary infrastructure to the consented 9 kilometres (km) buried onshore grid connection, spanning from the landfall for Dogger Bank Wind Farm C (DB-C) and Sofia Offshore Wind Farm (Sofia) to the National Grid at Lackenby Substation (the Works). Figures 1.2 (a - c) of the Environmental Appraisal show the location of the Works, the consented 2015 DCO and the planning application boundary.

1.1.4 This Hydrology and Drainage Assessment has been prepared by Stantec to support this Application.

1.1.5 This assessment is based on the available flood risk information for the area within the Works as detailed in **Section 1.3** and prepared in accordance with the planning policy requirements set out in **Section 1.4**. The scope of this report is consistent with the 'Site-specific Flood Risk Assessment Checklist' from the NPPF Planning Practice Guidance.

1.1.6 Stantec has many years of experience in, amongst other areas, the assessment of flood risk, hydrology, flood defence and river engineering. This report was prepared by Ed Turner and reviewed by Richard Fisher and Rob Gully. The authors and reviewers of the document are all experienced engineers and members of chartered institutions such as the Chartered Institution of Water and Environmental Management (CIWEM) or the Institution of Civil Engineers (ICE).

1.2 Relevant Background

1.2.1 The Applicants' Projects, including the onshore transmission works required to export electricity to the grid, were awarded a DCO in August 2015. The offshore arrays are within the Dogger Bank offshore zone in the North Sea and are two of four consented offshore wind farms within the zone. The 2014 DCO ES sets out the description of development for the DCO Cable Route.

1.2.2 The 2015 DCO awards consent for all infrastructure required for delivering two independent offshore wind farms, including the two arrays and all offshore and onshore transmission infrastructure necessary to export the electricity generated into the existing Lackenby Substation. Both DB-C and Sofia are progressing towards construction following successful award of a Contract for Difference (CfD) in the UK Government's 2019 auction.

1.2.3 The landfall of the High Voltage Direct Current (HVDC) cables is between Redcar and Marske-by-the-Sea. The HVDC cables run through agricultural land to the Onshore Converter Station (OCS) site which is located on arable land, to the south of the Wilton Industrial complex, north east of the village of Lazenby. The converter stations (one for DB-C and another for Sofia) convert the power from HVDC to High Voltage Alternating Current (HVAC). The HVAC cables continue for 2 km west to connect into the existing National Grid substation

at Lackenby, south of Grangetown. The total length of the onshore cables is approximately 9 km.

1.2.4 The consented HVDC onshore route is 36 metres (m)-wide in total, which allows for two adjacent 18 m-wide corridors, one per project (DB-C and Sofia). The HVAC cable route is approximately 40 m-wide. The width of both the HVDC and HVAC cable routes is considerably reduced in some areas (as narrow as 18 m).

1.2.5 The Applicants have undertaken a detailed review of the consented onshore cable corridors and identified that areas of alternative and additional infrastructure are now required in order to successfully build both DB-C and Sofia onshore cable routes. As such, the Application to RCBC to secure the consent for these works is required.

1.2.6 The Application consists of five areas outside the 2015 DCO Cable Route from the landfall to the National Grid at Lackenby Substation (the Works).

1.2.7 The Works is required to connect the Applicants' Projects to the National Grid at Lackenby substation, to allow for the export of renewable electricity generated. The Works is required as a number of landownership and engineering constraints have been identified following the grant of the DCO in August 2015.

1.3 Sources of Information

1.3.1 This report has been prepared based on the following sources of information:

EA '**Open Data**' datasets available online, reproduced with OS mapping under licence to Stantec (contains Ordnance Survey data © Crown copyright and database right [2019], contains Environment Agency information © Environment Agency and database right) – see **Appendix A**;

The **EA online flood maps** at https://flood-map-for-planning.service.gov.uk/ and https://flood-warning-information.service.gov.uk/long-term-flood-risk/;

Proposed development plans for Dogger Bank C & Sofia;

Redcar & Cleveland Borough Council (RCBC) **Preliminary Flood Risk Assessment** (PFRA); RCBC; dated June 2011;

Level 1 Strategic Flood Risk Assessment (SFRA) Update; RCBC, May 2016;

ES Chapter 24 – Geology, Water Resources and Land Quality, March 2014, Royal Haskoning DHV (on behalf of Forewind), dated March 2014.

1.3.2 Consultation was undertaken with Redcar and Cleveland Borough Council (RCBC) in its role as LLFA, regarding existing flood risk issues by means of a pre-application data request on 3rd April 2020.

1.3.3 Consultation has also been undertaken with the EA. Copies of Stakeholder consultation responses are provided in **Appendix B**.

1.3.4 A site walkover was undertaken in March 2020, with the purpose of walking the whole length of the Works and identifying watercourses and drainage features.

1.4 Relevant Planning Policy

1.4.1 This assessment has been prepared in accordance with the relevant national, regional and local planning policy and statutory authority guidance as follows:

National policy contained within the revised **NPPF** dated June 2019, issued by the Ministry of Housing, Communities and Local Government, with reference to Section 14 'Meeting the challenge of climate change, flooding and coastal change';

The **NPPF Planning Practice Guidance (PPG)** released in March 2014 ('Flood Risk and Coastal Change' section) and updated in March 2020, which incorporates the EA **'Flood Risk Assessments: Climate Change Allowances'** guidance;

Defra **Non-statutory Technical Standards for Sustainable Drainage Systems** (March 2015);

The SuDS Manual (C753), CIRIA (2015);

Sewers for Adoption 7th Edition (September 2012);

BS 8582:2013 **Code of practice for surface water management for development sites** (November 2013);

EA **Rainfall run-off management for developments**, Report SC030219 (October 2016);

Local planning policy contained within the **'Redcar & Cleveland Local Plan'** (adopted May 2018), principally **Policy SD 7 – Flood and Water Management** which states that:

"Flood risk will be taken into account at all stages in the planning process to avoid inappropriate development in areas at current or future risk. Development in areas at risk of flooding, as identified by the Environment Agency flood risk maps, will only be granted where all of the following criteria are met:

- *the proposal meets the sequential and exception tests (where required) in relation to the National Planning Policy Framework;*
- *a site specific flood risk assessment demonstrates that the development will be safe, including the access and egress, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall; and*
- *new site drainage systems are well designed, taking account of events that exceed the normal design standard (e.g. consideration of flood flow routing and utilising temporary storage areas).*

All development proposals will be expected to be designed to mitigate and adapt to climate change, taking account of flood risk by:

- *ensuring opportunities to contribute to the mitigation of flooding elsewhere are taken;*
- *prioritising the use of sustainable drainage systems (SuDs);*
- *ensuring the full separation of foul and surface water flows; and*
- *ensuring development is in accordance with the Redcar and Cleveland Strategic Flood Risk Assessment.*

A site specific flood risk assessment will be required to be carried out to demonstrate that development is not at risk from flooding and that it does not increase flood risk elsewhere in the following circumstances:

- *proposals of 1 hectare in size or greater in Flood Zone 1; or*

- *proposals for new development (including minor development and change of use) in Flood Zones 3a or Flood Zone 2; or*
- *proposals for new development in areas susceptible to surface water flooding; or*
- *proposals situated in an area currently benefiting from defences; or*
- *proposals situated within 20m of a bank top of a main river; or*
- *proposals over a culverted watercourse or where development will be required to control or influence the flow of any watercourse; or*
- *where the proposed development may be subject to other sources of flooding.*
- *Surface water runoff not collected for use must be discharged to one or more of the following, listed in order of priority:*
- *discharge into the ground (infiltration); or where not reasonably practicable*
- *discharge to a surface water body; or where not reasonably practicable*
- *discharge to a surface water sewer, highway drain, or another drainage system; or where not reasonably practicable*
- *discharge to a combined sewer.*

For previously developed sites, the peak runoff rate from the development to any drain, sewer or surface water body for the 1-in-1 year rainfall event and the 1-in-100 year rainfall event, must be as close as reasonably practicable to the greenfield runoff rate from the site for the same rainfall event but should never exceed the rate of discharge from the development prior to redevelopment for that event. Discharge rates into surface water and combined sewers resulting from the redevelopment of brownfield sites will be limited to a maximum of 50% of flows consented for previous uses. For greenfield sites, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1-in-1 year rainfall event and the 1-in-100 year rainfall event, must not exceed the peak greenfield runoff rate from the site same event. Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or River Tees) the peak flow control standards and volume control standards need not apply.

Major developments will be required to submit a drainage plan to show the site drainage can be adequately dealt with. The proposed drainage scheme should incorporate SuDS unless it can be demonstrated that they would be inappropriate.

The drainage system must be designed and constructed so surface water discharged does not adversely impact the water quality of receiving water bodies, both during construction and when operational. New development should seek to improve water quality where possible, as well maintaining and enhancing the biodiversity and habitat of watercourses.

For the purpose of this policy, major development includes residential developments comprising 10 or more dwellings and other developments with a floor space of 1,000m^2 or more.

1.5 Caveats and Exclusions

1.5.1 This report has been prepared in accordance with the NPPF and local planning policy. The proposed flood management and surface water management strategies are based on the

relevant British Standards (BS8533), the standing advice provided by the EA or based on common practice.

1.5.2 The Construction (Design and Management) Regulations 2015 (the 'CDM Regulations') will apply to any future development of this site which involves "construction" work, as defined by the CDM Regulations. As such it is the responsibility of the proposed developer (ultimate client) to fulfil its duties under those regulations.

1.5.3 The approach for this report is based on the requirements of the EA and the LLFA. The report findings are based on data available at the time of the study and on the subsequent assessment that has been undertaken in relation to the development proposals as outlined in **Section 2.**

2 Development Description and Proposals

2.1 Site Description

2.1.1 The overall extent of the Works comprises approximately 20.6 hectares (ha) of primarily greenfield agricultural land situated to the north-east of Middlesbrough (postcode for the middle of the site TS11 8HH), site centre OS grid reference 459,800m E, 521,600m N – see **Figure 2.1**.

2.1.2 The site is bound to the north-west by Wilton International and to the north-east by the town(s) of Redcar and Marske-by-the-Sea. The site is predominately bound by agricultural land to the south, with the exception of Marske-by-the-Sea in the east and the villages of Lazenby and Lackenby to the west.

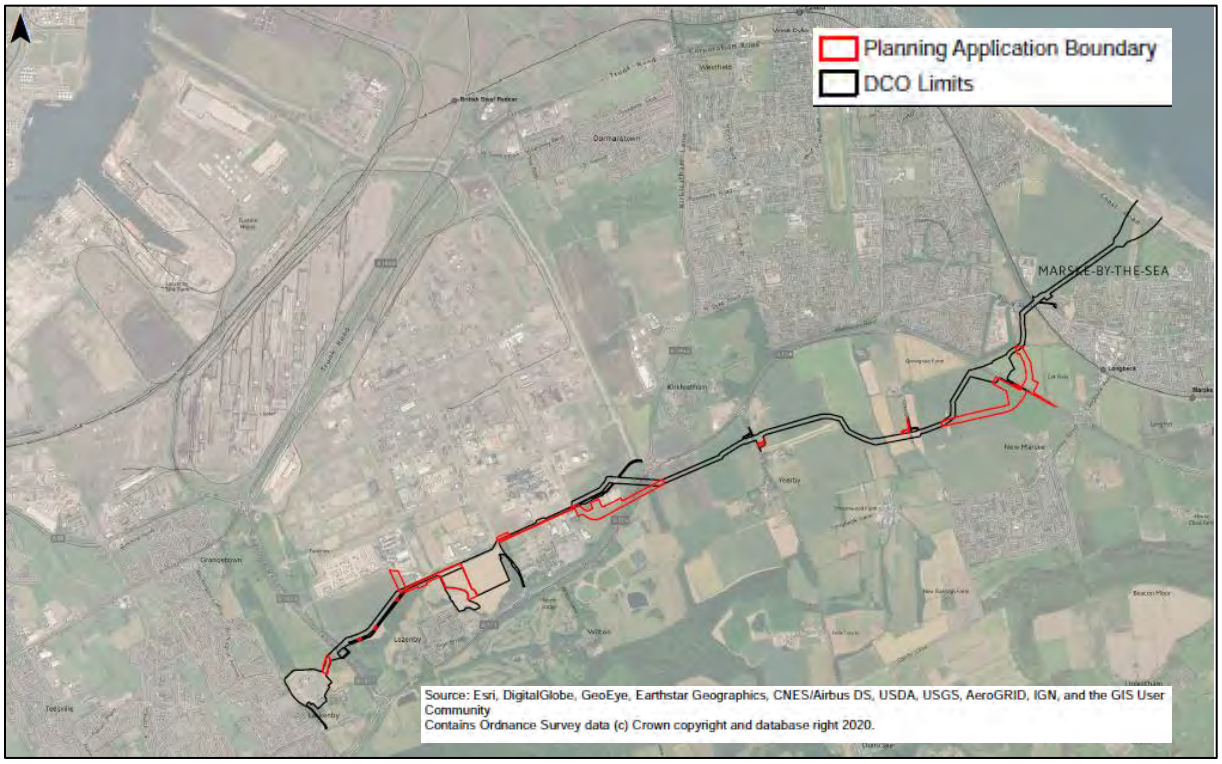


Figure 2-1 – Location Plan

2.1.3 The site lies within the administrative boundary of RCBC.

2.2 Overview of Consented Works

2.2.1 The works covered by the DCO include works related to landfall, the HVDC cable corridor, the onshore converter station (OCS), the HVAC cable corridor and the works at the National Grid Electricity Transmission (NGET) Lackenby Substation.

2.2.2 The landfall of the HVDC cables will be between Redcar and Marske-by-the-Sea. The landfall site and associated construction compounds and access routes to be used for the landfall construction works are unchanged from the DCO.

2.2.3 The underground onshore HVDC cable route from landfall to the converter stations site runs through agricultural land. On route to the converter stations a number of obstacles are to be

crossed. These include the A174 at two locations (to the west of Marske-by-the-Sea and to the south of Wilton International), a number of minor roads and the railway line between Redcar and Marske-by-the-Sea.

2.2.4 The DCO covered the installation of the HVDC cables by both open cut and Horizontal Directional Drilling (HDD) techniques and granted consent for a number of construction compounds and construction site access locations. The alternative HVDC cable routeing being considered by this planning application is detailed below.

2.2.5 Two converter stations are included within the 2015 DCO, one for each Project. These are located in a shared location on arable land, inside of Wilton International to the south of the village of Lazenby. Each converter station is approximately 2ha. The location of the converter stations is unchanged from the DCO but additional land is to be secured in the vicinity of the converter stations under the planning application.

2.2.6 The HVAC cable route runs westwards through agricultural land between the converter stations site and the existing National Grid substation at Lackenby. A crossing of the A1053 dual carriageway is required. Although the route of the HVAC cables is largely unchanged, additional land for enabling works, construction compounds and construction access are required. These are detailed in **Section 2.3** below.

2.2.7 All works at the NGET Lackenby Substation will be completed within the area considered by the DCO and there are no changes proposed here.

2.3 Planning Application

2.3.1 As part of the ongoing detailed design work, some sections of re-routeing and additional land for construction compounds (CCs) outside of the existing consented DCO corridor have been identified. These areas are identified in **Figure 2.2**.

2.3.2 **Figure 2.2** identifies the original DCO boundary for DB-C and Sofia in black and the additional areas to be covered by this planning application in red.

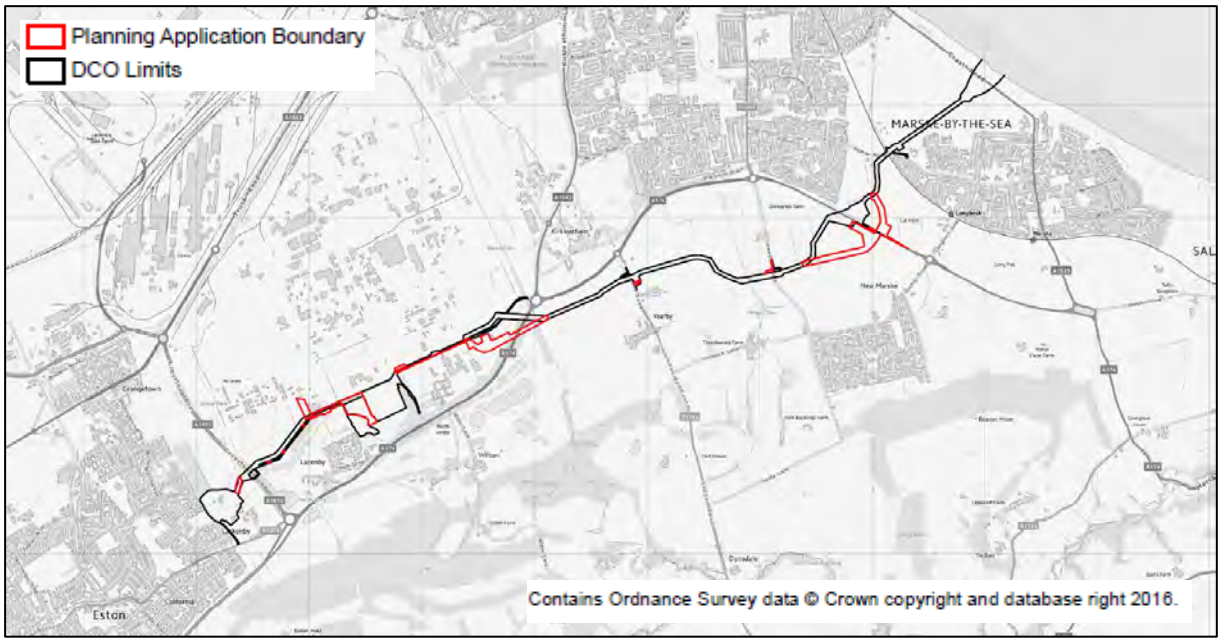


Figure 2-2 – Planning Application Boundary

2.3.3 The additional areas comprise:

1. A c. 1 km re-route of the cable corridor is required to the south east of Redcar to avoid a field with a new housing allocation.
2. Realignment of a section of the cable route crossing the A174 and entering Wilton International;
3. Widening of the HVDC cable corridor within Wilton International;
4. Additional land required for CC's and temporary construction accesses; and
5. Additional land associated with earthworks and the construction of a retaining wall to enable construction of the HVAC cable corridor.

3 Summary of Existing Baseline

3.1 Hydrological Setting

3.1.1 There are no EA designated 'Main Rivers' on site or within the immediate surrounding area. The closest main river watercourses to the site are the River Tees, approximately 4km to the north-west, and Skelton Beck, approximately 3 km to the south-east (see **Figure 4-1**).

3.1.2 The site is potentially influenced by a number of 'ordinary' watercourses as follows (moving from east to west):

Rogers Dike, which broadly flows south to north, towards the A174 (south of Redcar);

Mains Dike, which broadly flows north to south. It flows beneath the A174 at Mains Dike Bridge and then northwards along the eastern boundary of Wilton International;

Kettle Beck, which rises near Lackenby and flows northwards beneath the A1053, along the western boundary of Wilton International.

3.1.3 From a preliminary analysis of open source LiDAR data there are also a number of smaller un-named watercourses and land drainage ditches which could influence the site.

3.2 Topography

3.2.1 There is a ridge of higher ground to the south of the proposed development, which trends north-east to south-west, and which denotes the watershed between the catchments of the River Tees (Tees Lower and Estuary) to the north and Skelton Beck to the south.

3.2.2 Ground elevations on site fall from west to east, from approximately 35 m above Ordnance Datum (AOD) to the north east of Lackenby Sub Station, to approximately 25 m AOD at Cat Flatt Lane to the north east of the A174.

3.3 Geology and Hydrogeology

3.3.1 From a review of the 1:50 000 scale geology map from the British Geological Survey (BGS) online digital viewer, the bedrock beneath the entire planning application boundary comprises the Redcar Mudstone Formation. The mudstone is classified by the EA as a "Secondary (undifferentiated)" aquifer.

3.3.2 The superficial geology for the majority of the site comprises Diamicton deposits of clay, sand and gravel. The Diamicton deposits are classified as a 'Secondary (undifferentiated)' aquifer. There is a narrow lens of sand and gravel deposits located to the west of Yearby, which trend south-westwards through the village of Lazenby and north of Lackenby. The sand and gravel deposits are classified as a 'Secondary A' aquifer, which are defined as permeable layers capable of supporting water supplies at a local rather than strategic (regional) scale.

3.3.3 The UK Soil Observatory (UKSO) online 'Soilscapes for England and Wales' viewer indicates that the entire site is located on *"'slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils"*.

3.3.4 The site is not located within an EA Groundwater 'Source Protection Zone' (SPZ). The nearest SPZ to the site is located at a distance greater than 2km away.

3.4 Water Quality

3.4.1 The closest EA surface water quality monitoring points are located in excess of 3 km away from the Works, on Skelton Beck. Analysis of the monitoring points (sourced from ES Chapter 24 – Geology, Water Resources and Land Quality, March 2014, Forewind) is summarised in **Table 3-1**. There is no available data for either Rogers Dike or Mains Dike.

Sample Location ID	National Grid Reference		Distance from site (km)	Period of data availability	Analytical suites	2009 Grade
	X	Y				
Tocketts Mill – Saltburn Gill (Skelton Beck)	462760	518100	>3	1990-2009	Ammonia Dissolved Oxygen Nitrates Phosphates	Chemistry – C Biology – B Nitrates – 2 Phosphates - 4
Howl Beck – Tocketts Mill (Skelton Beck)	462040	518400	>3	1990-2009	Ammonia Dissolved Oxygen Nitrates Phosphates	Chemsitry – A Biology - / Nitrates – 3 Phosphates – 2

Table 3-1 – Summary of Water Quality (ES Chapter 24, March 2014, Forewind).

3.4.2 The chemistry of the Tees Mercia Mudstone & Redcar Mudstone groundwater body (also sourced from ES Chapter 24) is classified as 'At Risk' with 2009 Chemical Quality classified as 'Poor' and predicted 2015 Chemical Quality also classified as 'Poor'.

3.5 Existing Drainage Arrangements

3.5.1 Much of the site comprises greenfield agricultural land which drains northwards via the ordinary watercourses described in **Section 3.1**.

3.5.2 The existing National Grid Lackenby substation has its own surface water drainage system and there will be no change to these arrangements as a result of the Works.

3.6 Existing Sewers

3.6.1 It is our understanding from previous correspondence with Northumbrian Water, undertaken by Forewind as part of the previous assessment, that there are no records of historic flooding that would affect the Works area (as of 2013).

3.6.2 The only incidences of historic sewer flooding were in the nearby urban areas of Marske-by-the-Sea, New Marske and Redcar.

3.7 Flood Risk

3.7.1 The first phase in identifying whether a site is potentially at risk of flooding is to consult the EA's Flood Zone maps, available on the GOV.UK website. This provides an initial indication of the extent of the Flood Zones. The Flood Zones are defined in Table 1 of the PPG ('Flood Risk and Coastal Change' section) as follows:

- **Flood Zone 1 'Low Probability'** – Land at less than 1 in 1000 (0.1%) annual probability of river or sea flooding;

- **Flood Zone 2 'Medium Probability'** – Land between 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability of river flooding, or between 1 in 200 (0.5%) and 1 in 1000 (0.1%) annual probability of sea flooding; and

- **Flood Zone 3 'High Probability'** – Land at 1 in 100 (1%) or greater annual probability of river flooding, or 1 in 200 (0.5%) or greater annual probability of sea flooding.

3.7.2 A Flood Risk Assessment (FRA) was completed as part of the 2014 ES, specifically Chapter 24, Appendix B.

3.7.3 The project area of the report covered:

- The underground onshore HVDC cable route from landfall to the Onshore Converter Stations (OCSs);

- The OCSs;

- The HVAC cable route between the OCSs and the National Grid at the existing Lackenby Substation; and

- The National Grid enabling works at the existing National Grid Electricity transmission (NGET) Lackenby Substation.

3.7.4 The key conclusions from the 2014 FRA can be summarised as:

- The OCS sites are located within Flood Zone 1 demonstrating it is not at risk from fluvial sources;

- Drainage solutions are proposed within the design to reduce the rate of surface water runoff from the OCS sites; and

- The enabling works at the existing at Lackenby Substation are to be carried out within the existing site which is entirely within Flood Zone 1.

3.7.5 A review of the current EA online flood map indicates that these areas remain within Flood Zone 1 – see **Section 4.2.**

4 Overview of Flood Risk

4.1 Introduction

4.1.1 The following has been determined from the Stantec GIS flood maps in **Appendix A** based on the EA Opendata datasets available online, and reproduced with OS mapping under licence to Stantec.

4.2 Flood Map for Planning (Flood Zone)

A copy of the current EA Flood Map for the site is included in Figure 004 of **Appendix A**.

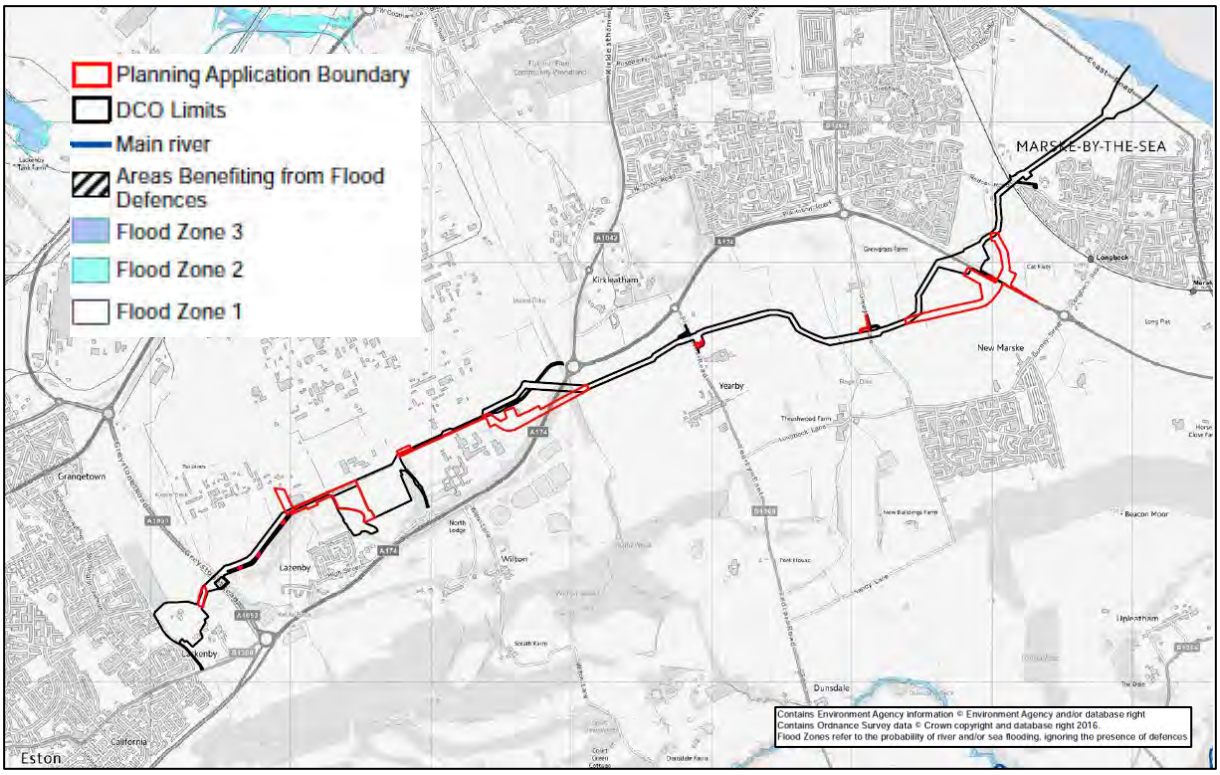


Figure 4-1 – EA Flood Map for Planning

4.2.1 The Flood Zone map does not differentiate between Flood Zone 3a 'High Probability' and Flood Zone 3b 'Functional Floodplain' (the defined Flood Zone 3 is effectively a composite of Zone 3a and Zone 3b, and further review of the SFRA is required to define the extent of Zone 3b).

4.2.2 The mapping indicates that all work areas covered by this planning application lie within Flood Zone 1 'Low Probability'.

4.3 Flood Risk from Reservoirs

4.3.1 The EA provides maps showing the risk of flooding in the event of a breach from reservoirs, based only on large reservoirs (over 25,000 cubic metres of water).

4.3.2 While these are no longer available for download as part of the EA Opendata dataset, they remain available for review on the .GOV.UK 'Long Tern Flood Risk Information' at https://flood-warning-information.service.gov.uk/long-term-flood-risk/ - see **Figure 4-2.**

Figure 4-2 – EA Reservoir Flood Map (extract from GOV.UK website)

4.3.3 This mapping shows that the majority of the area is outside any areas of residual risk, but the planning application boundary within Wilton International are at risk in the event of a reservoir breach.

4.3.4 It should be emphasised that the likelihood of flooding from reservoir breach is very small in any case; the EA is the enforcement authority for the Reservoirs Act (1975) and all large raised reservoirs are inspected and supervised by reservoir panel engineers.

4.3.5 The EA's website states:

> '*Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, we ensure that reservoirs are inspected regularly and essential safety work is carried out'.*

4.3.6 The risk of such an occurrence is therefore considered negligible.

4.4 Flood Risk from Surface Water

4.4.1 The EA 'Flood Map for Surface Water' ('FMfSW') shows where areas could be potentially susceptible to surface water flooding in an extreme rainfall event. The latest mapping assesses flooding resulting from severe rainfall events based on the following three scenarios:

- 1 in 30 (3.3%) annual probability rainfall event ('High' risk);
- 1 in 100 (1%) annual probability rainfall event ('Medium' risk); and
- 1 in 1000 (0.1%) annual probability rainfall event ('Low' risk).

4.4.2 Land at lower than 1 in 1000 (0.1%) annual probability of flooding is considered to be at 'Very Low' risk of flooding.

4.4.3 An extract of the FMfSW for the site is shown in **Figure 4-3**. A copy of the full map is also included in Figure 005 of **Appendix A**, with Figures 005a, 005b and 005c showing predicted flood depths for each of the three risk scenarios.

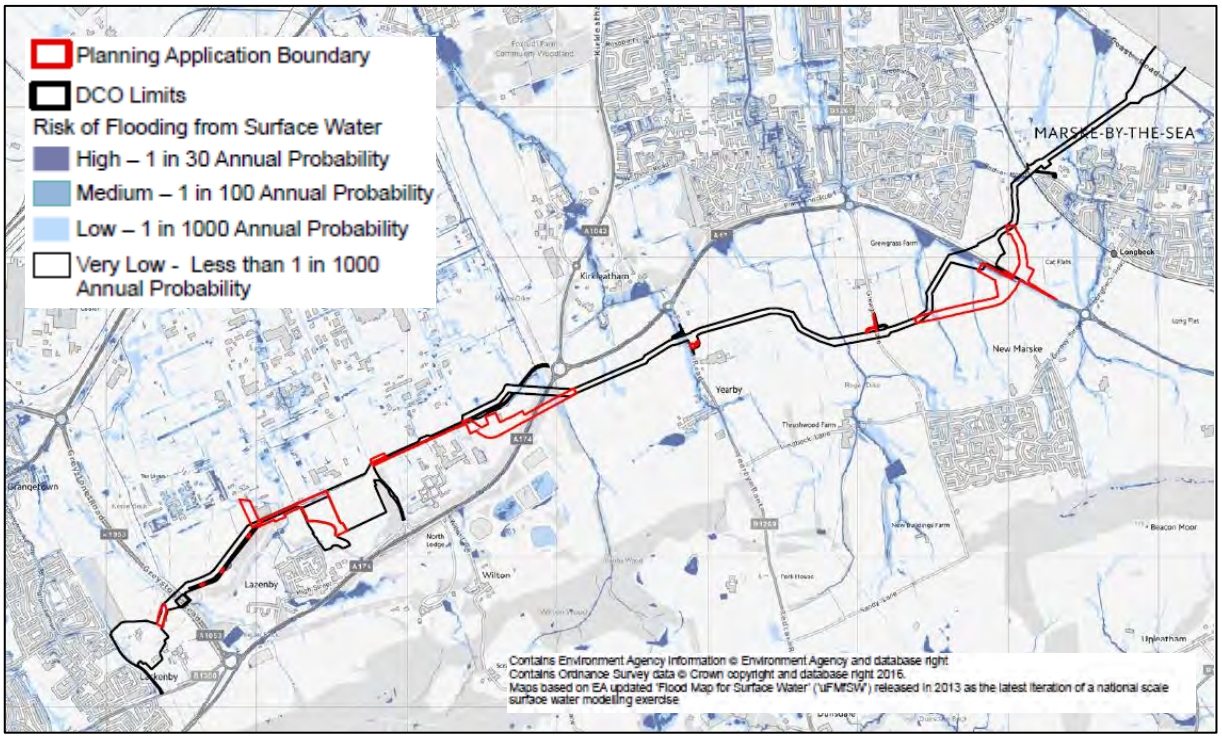


Figure 4-3 – EA Flood Map for Surface Water

4.4.4 It should be noted that the surface water maps are generated using a generic methodology on a national scale, whereby rainfall is routed over a ground surface model. The analysis does not take account of any specific local information on below-ground drainage infrastructure and infiltration, although an adjustment is included in urban areas to account for the impact of sewerage and a standard infiltration allowance based on soil type. Consequently, the mapping provides a guide to potentially vulnerable areas based on the general topography of an area.

4.4.5 The FMfSW does not include representation of the projected impacts of climate change, which are expected to lead to increased rainfall intensity in the future, and which would normally be considered with respect to the 1 in 100 (1%) annual probability event. As a precautionary approach, the 1 in 1000 (0.1%) annual probability event has therefore been considered as the 'design event' for surface water flooding.

4.4.6 The FMfSW indicates that the majority of the work areas considered by this planning application have a 'Very Low' risk of surface water flooding, with only highly localised areas shown to have 'Medium' and 'High' risk flow path along the section of the A174 west of Marske-by-the-Sea.

4.5 Historic Flood Map

4.5.1 The EA 'Historic Flood Map' is a dataset showing the maximum extent of all individual recorded flood outlines from river, the sea and groundwater and shows areas of land that have previously been subject to flooding. None of the work areas lie in an area of recorded historic flooding. A copy of the map is also included in Figure 007 of **Appendix A**.

4.6 Groundwater

4.6.1 The SFRA and data sources used to inform the SFRA indicate there is little evidence of groundwater flooding occurring at or in the vicinity of the work areas considered by this planning application. Aquifer Designation Mapping for the area indicates the underlying geology to be classified as a Secondary or Unproductive Aquifer.

4.7 Strategic Flood Risk Assessment

4.7.1 Information contained in the Redcar and Cleveland SFRA update 2016 has been reviewed as part of this study. Mapping provided in Appendix A of the SFRA indicates that none of the works areas considered by this planning application are located in areas shown to be at risk from flooding from River or sea.

4.8 Impact of Climate Change

4.8.1 In considering flood risk, it is normally necessary to fully consider the potential impacts of climate change for the lifetime of the development. Given that the majority of the works considered by the planning application are temporary, and all permanent works will be located below ground and are not affected by flooding, it is not necessary to further consider the impact of climate change or potential mitigation measures.

4.9 Summary of Flood Risk

4.9.1 **Table 4.3** provides an overview of the flood risk to the site, based on the information obtained and detailed in **Section 4**.

Table 4-1 – Summary of Sources of Flood Risk

Source of Flooding	Risk of Flooding to Site	Comment/Justification	Source of data	Mitigation requirements (see Section 5)
Tidal		The work areas are not in an area at risk of tidal flooding.	OS mapping	n/a
Fluvial		The work areas are not located with areas susceptible to fluvial flooding in the 1 in 100 (Flood Zone 3a) and 1 in 1000 year event (Flood Zone 2). The site is not susceptible to fluvial flooding in the 1 in 20 year event (Flood Zone 3b). Historic records of fluvial flooding show no history of flooding.	SFRA EA Flood Map for Planning	n/a
Surface Water/ Pluvial)		The majority of the site has a 'Very Low' susceptibility to surface water flooding.	EA surface water flood maps	Ensure proposed drainage arrangements in line with national and local policy requirements – see Section 6
Ground water		No mention of historic groundwater flooding on site in the SFRA and general ground conditions (mudstone) suggest the risk is low.	SFRA BGS Viewer	n/a
Reservoir, Canals, Ponds and Other Artificial Sources		Works areas within Wilton International are shown to be in an area at risk in the event of a reservoir breach, but likelihood of breach is considered extremely low.	Flood Risk from Reservoirs Map	n/a
Key:		**Low/Negligible Risk** – No noticeable impact to site and not considered to be a constraint to development		
		Medium Risk – Issue requires consideration but not a significant constraint to development		
		High Risk – Major constraint to development requiring active consideration in mitigation proposals		

5 The Works and Flood Risk Mitigation

5.1 The Works

5.1.1 This Flood Risk Assessment has been prepared to support a planning application for the partial alignment of the onshore element associated with Sofia and DB-C.

5.1.2 Drawing 46941/4001/001 in **Appendix C** shows the location of the works areas with respect to local watercourses.

5.2 Flood Risk Vulnerability

5.2.1 NPPF PPG 'Flood Risk and Coastal Change' Table 2 confirms the *'Flood risk vulnerability classification'* of a site, depending upon the proposed usage. This classification is subsequently applied to PPG Table 3 to determine whether:

The proposed development is suitable for the flood zone in which it is located, and;

Whether an Exception Test is required for the proposed development.

5.2.2 The proposals are classified as 'Essential Infrastructure'. Table 3 confirms that Essential Infrastructure is appropriate development within Flood Zone 1 and 2 and is permitted within Flood Zone 3a and 3b provided an Exception Test is passed.

5.2.3 All work areas covered by the planning application lie within Flood Zone 1 'Low Probability'. Furthermore, the principle of the onshore works within this general area has already been proven through the 2015 DCO.

5.3 Flood Risk Mitigation

5.3.1 The nature of the Works and low level of flood risk means that there is no specific requirement for bespoke mitigation measures to be implemented to manage flood risk to the cable corridor works or in terms of the potential impact of these works on flood risk elsewhere.

5.3.2 There is still the potential for the surface water runoff regime to be affected by the Works, albeit temporarily. In particular, there will be the potential for an impact at any construction compound or construction access where temporary metalled surfacing will be provided. Mitigation measures for the temporary impact on surface water drainage are discussed in **Section 6**.

5.3.3 It is noted that works at the watercourses to install the cable corridor have the potential to temporarily affect the function of the watercourse and conveyance of water. Access crossings are likely to require Land Drainage Consent for the completion of these works in due course from RCBC, as the LLFA.

5.3.4 All watercourses are planned to be crossed using trenchless techniques such as HDD, there is no anticipated impact on the watercourse and no further mitigation will be required.

5.3.5 The Works considered by this Application that will occur at or in the direct vicinity of any watercourse are identified on drawing 46941/4001/001 in **Appendix C.**

6 Drainage Strategy

6.1 Surface Water Management Strategy

6.1.1 Policy SD7 of the Redcar and Cleveland Local Plan 2018 sets out the criteria for the management of surface water runoff under which planning consent will be granted. The policy states:

"Surface water runoff not collected for use must be discharged to one or more of the following, listed in order of priority:

i. discharge into the ground (infiltration); or where not reasonably practicable

ii. discharge to a surface water body; or where not reasonably practicable

iii. discharge to a surface water sewer, highway drain, or another drainage system; or where not reasonably practicable

iv. discharge to a combined sewer."

6.1.2 The policy also stipulates that:

> *"The drainage system must be designed and constructed so surface water discharged does not adversely impact the water quality of receiving water bodies, both during construction and when operational. New development should seek to improve water quality where possible, as well maintaining and enhancing the biodiversity and habitat of watercourses".*

6.1.3 Further correspondence with the LLFA has confirmed the following design standards governing discharge rates and control of flooding for surface water management schemes*:*

I. Restriction of surface water greenfield run-off rates (QBAR value) with sufficient storage within the system to accommodate a 1 in 30 year storm.

II. The method used for calculation of the existing greenfield run-off rate shall be the ICP SUDS method. The design shall also ensure that storm water resulting from a 1 in 100 year event, plus climate change surcharging the system, can be stored on site with minimal risk to persons or property and without overflowing into drains, local highways or watercourses."

6.1.4 As identified in **Section 5**, the potential for impact on the surface water runoff regime is temporary and will principally be limited to construction compounds and construction access where temporary metalled surfacing will be provided. The mitigation measures for these areas will ultimately be detailed in the Code of Construction Practice (CoCP) and Construction Environmental Management Plans (CEMPs). Production of these documents is a Requirement of the 2015 DCO and substantively the same mitigation will be secured through planning conditions for the Works covered by this Application.

6.1.5 Notwithstanding emerging details of surface water management through production of the CoCP and CEMP, drainage measures for the construction compounds and construction accesses will still be expected to comply with the polices and guidance set out above.

6.1.6 Details pertaining to the timetable and phasing for construction of the drainage systems, duration of their intended use and management and maintenance of the drainage system during construction activities should be provided in the CEMP. Details of any control structures or

surface water storage structures and measures to control silt levels should also be provided in the CEMP.

6.2 Foul Water Management

6.2.1 There is no requirement for new permanent foul water drainage infrastructure associated with any aspect of the Works being considered under this Application.

6.2.2 Welfare facilities associated with the Works will be temporary and suitable measures will be implemented under the CoCP and CEMP to manage any foul effluent arising during construction.

7 Conclusions

7.1.1 This Flood Risk Assessment has been prepared by Stantec, on behalf of our clients SOWFL and the Projco, to support a planning application for the partial alternative alignment of the onshore element associated with Dogger Bank C/Sofia Offshore Wind Farm.

7.1.2 The proposals consider a number of works areas along the length of the cable corridor approved under a previous DCO. The nature of the works in these areas is associated with the installation of below ground infrastructure or temporary above ground works to provide construction compounds or construction accesses only.

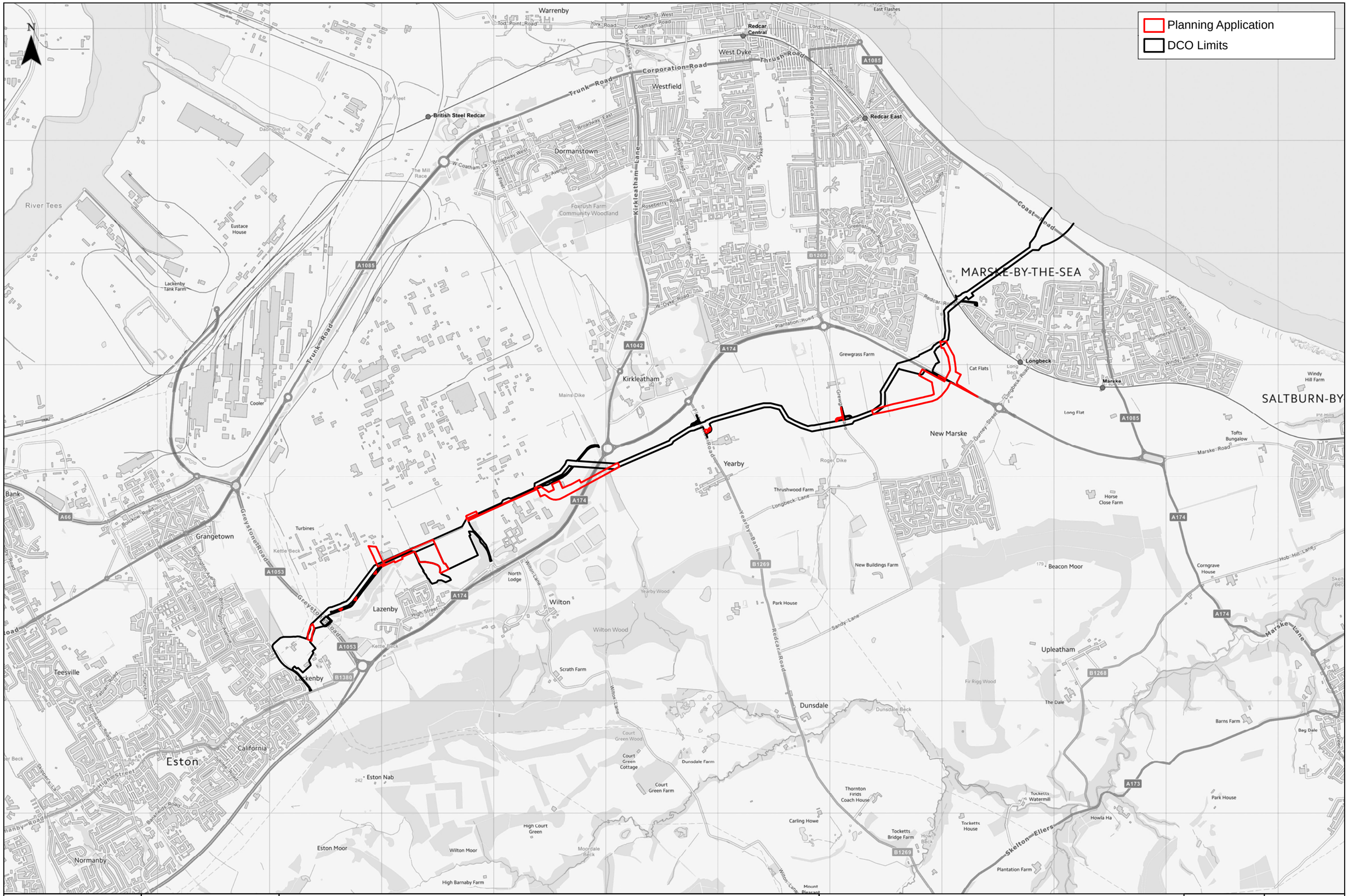
7.1.3 This FRA concludes that:

- The EA Flood Map for Planning confirms the proposed works areas being considered are located within Flood Zone 1 'Low Probability' and there is no significant risk of flooding from other sources to any of these areas;
- The Works, as 'essential infrastructure', are considered appropriate under PPG associated with the NPPF;
- The Works do have the potential to temporarily affect surface water drainages regimes during construction, but appropriate surface water management measures can be implemented to mitigate these impacts. Details of these measures will be set out in the CoCP and CEMP, which are required to be prepared under the 2015 DCO.

7.1.4 In conclusion, the proposals comply with the NPPF and local planning policy with respect to flood risk and is therefore appropriate at this location.

Appendix A OpenData Flood Maps

- Site Location Plan
- Site Location (Aerial Photography)
- Area Topography (LiDAR)
- EA Flood Zone Map
- EA Surface Water Flood Risk
- EA Surface Water Flood Risk – Depth 3.3 Percent Chance
- EA Surface Water Flood Risk – Depth 1.0 Percent Chance
- EA Surface Water Flood Risk – Depth 0.1 Percent Chance
- EA Ground Water Source Protection Zones
- EA Historic Flood Map



Stantec	Client: Sofia and Dogger Bank C	**Dogger Bank C/Sofia Onshore Works Application** Site Location	1:30,000 @ A3	Date: 01/07/2020
			Drawn: JP	Checked: SK
			Figure 001	Rev A

Z:\Projects\46941\02_mxd\FRA\mxd/Figure007_HistoricFloodMap.mxd

Stantec	Client: Sofia and Dogger Bank C	**Dogger Bank C/Sofia Onshore Works Application** Site Location (Aerial)	0 1 2 km Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Contains Ordnance Survey data (c) Crown copyright and database right 2020.	1:30,000 @ A3	Date: 01/07/2020
				Drawn: JP	Checked: SK
				Figure 002	Rev A

Z:\Projects\46941\02_mxd\FRA\mxd/Figure007_HistoricFloodMap.mxd

Stantec	Client: Sofia and Dogger Bank C	**Dogger Bank C/Sofia Onshore Works Application** Topography	0 1 2 km Contains Environment Agency information Environment Agency and/or database right Contains Ordnance Survey data © Crown copyright and database right 2016.	1:30,000 @ A3 | Date: 01/07/2020 Drawn: JP | Checked: SK Figure 003 | Rev A

Z:\Projects\46941\02_mxd\FRA\mxd/Figure007_HistoricFloodMap.mxd

Planning Application Boundary
DCO Limits
Main river
Areas Benefiting from Flood Defences
Flood Zone 3
Flood Zone 2
Flood Zone 1

N

Stantec

Client:
Sofia and Dogger Bank C

Dogger Bank C/Sofia Onshore Works Application

EA Flood Zone

0 1 2 km

1:30,000 @ A3 | Date: 01/07/2020
Drawn: JP | Checked: SK
Figure 004 | Rev A

Z:\Projects\46941\02_mxd\FRA\mxd/Figure007_HistoricFloodMap.mxd

Planning Application Boundary

DCO Limits

Risk of Flooding from Surface Water

High – 1 in 30 Annual Probability

Medium – 1 in 100 Annual Probability

Low – 1 in 1000 Annual Probability

Very Low - Less than 1 in 1000 Annual Probability

Stantec

Client: Sofia and Dogger Bank C

Dogger Bank C/Sofia Onshore Works Application

EA Surface Water Flood Risk

0 1.5 3 km

1:30,000 @ A3 | Date: 01/07/2020

Drawn: JP | Checked: SK

Figure 005 | Rev A

Z:\Projects\46941\02_mxd\FRA\mxd/Figure007_HistoricFloodMap.mxd

Planning Application Boundary
DCO Limits
Risk of Flooding from Surface Water - Depth
Below 150mm
150 - 300mm
300 - 600mm
600 - 900mm
900 - 1200mm
Over 1200mm

Stantec	Client: Sofia and Dogger Bank C	**Dogger Bank C/Sofia Onshore Works Application** EA Surface Water Flood Risk - Depth 3.3 Percent Chance	0 1 2 km	1:30,000 @ A3 / Date: 01/07/2020
				Drawn: JP / Checked: SK
				Figure 005a / Rev A

Z:\Projects\46941\02_mxd\FRA\mxd/Figure007_HistoricFloodMap.mxd

Planning Application Boundary
DCO Limits
Risk of Flooding from Surface Water - Depth
Below 150mm
150 - 300mm
300 - 600mm
600 - 900mm
900 - 1200mm
Over 1200mm

Stantec

Client:
Sofia and Dogger Bank C

Dogger Bank C/Sofia Onshore Works Application
EA Surface Water Flood Risk - Depth
1.0 Percent Chance

0 1 2 km

1:30,000 @ A3	Date: 01/07/2020
Drawn: JP	Checked: SK
Figure 005b	Rev A

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Planning Application Boundary
DCO Limits
Risk of Flooding from Surface Water - Depth
Below 150mm
150 - 300mm
300 - 600mm
600 - 900mm
900 - 1200mm
Over 1200mm

N

Stantec

Client:
Sofia and Dogger Bank C

Dogger Bank C/Sofia Onshore Works Application

EA Surface Water Flood Risk - Depth
0.1 Percent Chance

0 1 2 km

1:30,000 @ A3 | Date: 01/07/2020
Drawn: JP | Checked: SK
Figure 005c | Rev A

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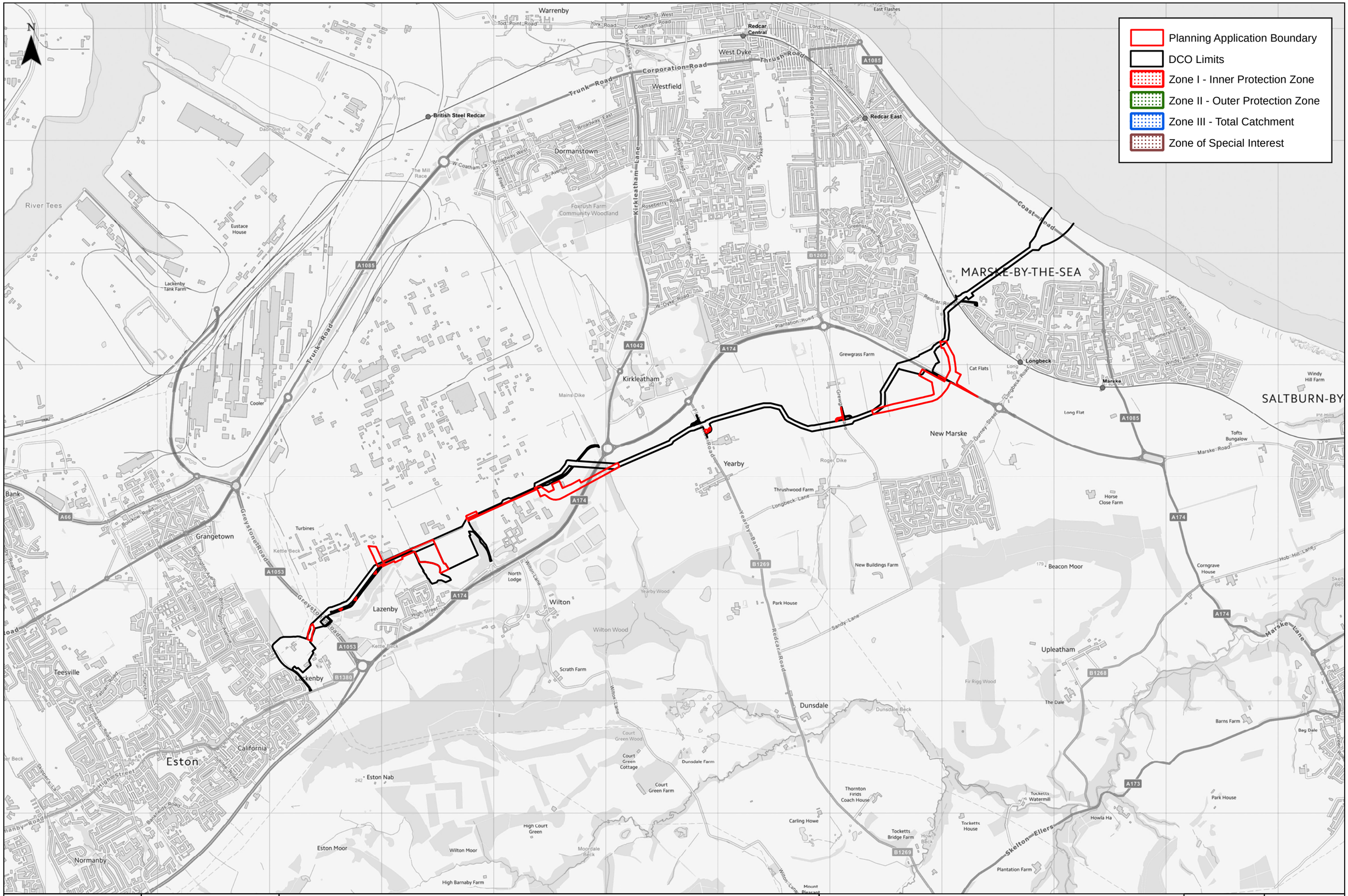


Stantec	Client: Sofia and Dogger Bank C	**Dogger Bank C/Sofia Onshore Works Application** EA Ground Water Source Protection Zones	0 1 2 km	1:30,000 @ A3 / Date: 01/07/2020 Drawn: JP / Checked: SK Figure 006 / Rev A

Z:\Projects\46941\02_mxd\FRA\mxd/Figure007_HistoricFloodMap.mxd

Planning Application Boundary
DCO Limits
Historic Flood Extent
Recorded Flood Outline

N

Stantec

Client:
Sofia and Dogger Bank C

Dogger Bank C/Sofia Onshore Works Application
EA Recorded Historic Flood Extents

0 1 2 km

Historic Flood Map shows the maximum extent of all individual Recorded Flood Outlines from river, the sea and groundwater springs and shows areas of land that have previously been subject to flooding in England.
Recorded Flood Outlines shows all EA records of historic flooding from rivers, the sea, groundwater and surface water

1:30,000 @ A3 | Date: 01/07/2020
Drawn: JP | Checked: SK
Figure 007 | Rev A

Z:\Projects\46941\02_mxd\FRA\mxd/Figure007_HistoricFloodMap.mxd

Appendix B Stakeholder Consultation

Your ref:

Our ref: 46941 Sofia OWF EA Data Request 200403

3rd April 2020

Environment Agency

Stantec UK Limited
Waterloo House
Victoria Square
Birmingham B2 5TB
T: +44 (0)121 633 2900
E: Richard.Laker@Stantec.com

E-mail: enquiries@environment-agency.gov.uk

Attn: Customer & Engagement Team – North Yorkshire Area

Dear Sir or Madam,

RE: REQUEST FOR FLOOD RISK AND DRAINAGE INFORMATION FOR TEESIDE A AND SOFIA OFFSHORE WIND FARM, REDCAR, TS11 8HH.

Stantec has been instructed to complete a Flood Risk Assessment (FRA) and Drainage Strategy (DS) for the partial realignment of the onshore element associated with Teeside A and Sofia Offshore Wind Farm (hereafter referred to as "Sofia"). A Development Consent Order ("DCO") was granted jointly for the Teesside A (TSA) and Teesside B (now renamed Sofia) projects, covering all elements of the wind farms (onshore and offshore), in August 2015. An additional planning consent (under the Town and Country Planning Act (TCPA)) was granted by Redcar and Cleveland Borough Council in April 2016 for realignment of the cable route within the Wilton Works Complex. The centre of the site is located at NGR 460271 (E), 521368 (N), nearest postcode TS11 8HH. A site location plan is enclosed on page 3 of this letter.

The site is shown on the EA's online Flood Map for Planning to be located entirely within Flood Zone 1. Whilst the majority of the proposed cable route is located within areas that have a 'very low' risk of surface water flooding, the cable route does cross areas with a 'low', 'medium' and 'high' risk. The 'low' to 'high' risk areas in particular may be associated with low-lying topography and existing watercourses that cross the site boundary. The cable route outside of the Wilton Works site is generally greenfield and we assume that it currently drains either by infiltration or via the existing network of field drains and ditches.

We are now compiling information and data for use within the Flood Risk Assessment. The assessment of flood risk will consider all potential sources of flooding (fluvial, tidal, surface water, groundwater, surcharging sewers, and other artificial sources). To ensure a comprehensive appraisal of flood risk related constraints we would be grateful if you would provide the following information, where available:

1) A detailed flood map for the site and surrounding area, to include the floodplains for the 1 in 20 year, 1 in 100 year and 1 in 1,000 year floodplains with and without climate change and any other available return periods. This should be provided as part of **EA Product 4**: Detailed FRA Map for the local area which **MUST** include the following (where the data is available):

    - Ordnance Survey 1:25k colour raster base mapping;
    - Flood Zone 2 and Flood Zone 3;
    - Model node locations for the Main River and ordinary watercourses within the vicinity of the site (if available) and unique identifiers;
    - Extents of the modelling for the Main River and ordinary watercourses;

- Flood defence locations displayed on a map, levels, unique identifiers and any areas benefiting from defences;
- Locations of any flood storage areas;
- Historic flooding information and flood outlines with unique identifiers;
- Statutory (Sealed) Main River extents;
- A table showing:

- Model node X/Y coordinate locations, unique identifiers, levels, flows and JFLOW (or other modelled) flood depths
- Flood defence locations unique identifiers and attributes
- Historic flood events outlines unique identifiers and attributes
- Local flood history data.

2) Separate issue of Products 5, 6 and 7

3) Details of any historic flooding in the area of interest (to include written reports, photos, flood extent outlines, duration, return period etc., and commentary on the source/mechanisms of flooding and also including information relating to antecedent conditions and confirmation of the month or season in which they occurred).

4) Information regarding any remedial works undertaken to alleviate flooding in the area of interest.

5) Details of flood defences (if any) immediately downstream and upstream of the site (e.g. standards of protection, ownership, condition, operational procedures and maintenance arrangements) and confirmation of any risk of defences being outflanked. This should include details of any schemes under consideration.

6) Any information about flood alleviation measures already in place, their state of maintenance and their performance and the current fluvial flood warning system.

7) Details of local hydraulic features/controls and hydrological influences within the vicinity of the site that should be considered when undertaking a flood risk assessment (e.g. condition, capacity, ownership, operational procedures and maintenance arrangements).

8) Confirmation of any design considerations for development of the site e.g. finished floor levels (and climate change allowances), mitigation measures, compensatory flood storage volume, access.

9) Details of the setback (easement) from watercourses (both main river and ordinary watercourses) required for developments within this area?

<u>Groundwater</u>

10) Details of any groundwater source protection zones and the nature of groundwater flow in the vicinity of the site i.e. is the site located on an aquifer? Please provide indicative details of the ground conditions and level of water table if possible.

11) Details of any known groundwater flooding issues.

<u>Surface Water</u>

12) The EA Flood Map for surface water for the wider site (indicating areas at risk in the 1 in 30 year and the 1 in 200 year storm events).

13) Details of any known surface water flooding at the site or nearby.

14) Details of any known capacity issues with culverted ordinary watercourses (if any), local highways drainage or surface water sewer systems which may result in existing sewerage/drainage problems in the vicinity of the site.

15) Details of any culverted watercourses and any other local hydraulic features/controls and hydrological influences within the vicinity of the site that should be considered when undertaking a flood risk

assessment (e.g. condition, capacity, ownership, operational procedures and maintenance arrangements).

We understand that there are potentially two culverted watercourses for which we are unsure of their exact location and condition – see the attached plan on page 4.

16) Indication of local permeability within the area of interest and suitability of infiltration measures as a means of discharge of surface water from any proposed development (where available).

Please provide information for points 1-16 outlined above. We would also ask that you provide contact details and availability for a conference call to discuss the scheme and obtaining all necessary consents and approvals.

Please provide any other details that may be of assistance and of any specific restrictions or constraints that may be applicable to any future proposed development.

Should you wish to discuss any other aspect of the above or any related matters, please feel free to contact me or Ed Turner on 0121 633 2900.

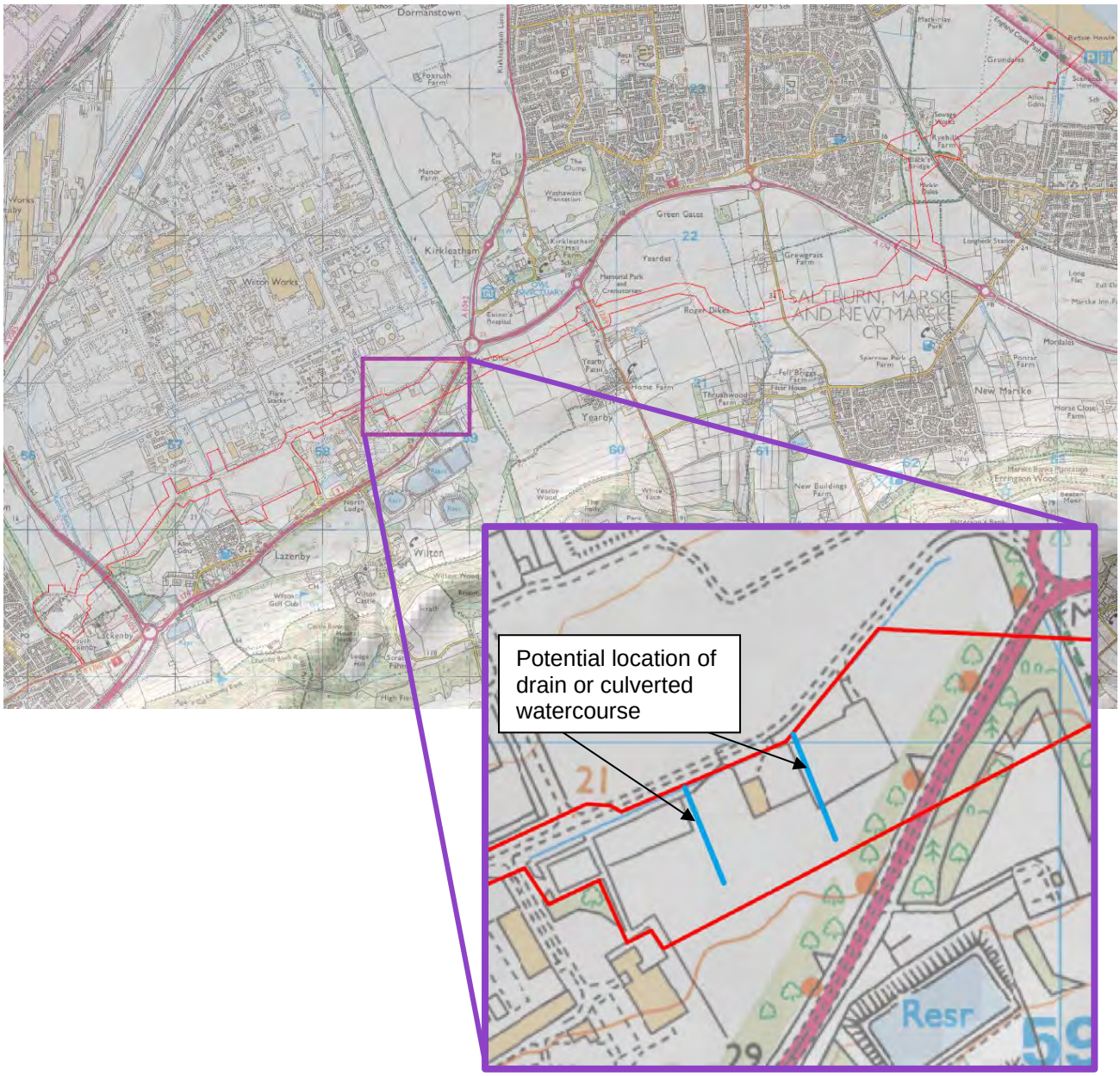
Yours faithfully,

Richard Laker
Senior Engineer Flood Risk and Surface Drainage

For and on behalf of
STANTEC UK LIMITED

Encs: Site Location Plan

Site Location Plan for TEESIDE A AND SOFIA OFFSHORE WIND FARM, REDCAR, TS11 8HH - NGR 460271 (E), 521368 (N)


Potential location of drain or culverted watercourse
Dormanstown
Kirkleatham
Witton Works
Lazenby
Wilton
Yearby
New Marske
SAL TBURN, MARSKE AND NEW MARSKE CP
Resr

Your ref:

Our ref: 46941 Sofia OWF RCBC Data Request 200402

2nd April 2020

Redcar & Cleveland Borough Council

Stantec UK Limited
Waterloo House
Victoria Square
Birmingham B2 5TB
T: +44 (0)121 633 2900
E: Richard.Laker@Stantec.com

E-mail: david.pedlow@redcar-cleveland.gov.uk
lyndsey.hall@redcar-cleveland.gov.uk

Attn: LLFA - Flood Risk and Drainage Team

Dear Lyndsey,

RE: REQUEST FOR FLOOD RISK AND DRAINAGE INFORMATION FOR TEESIDE A AND SOFIA OFFSHORE WIND FARM, REDCAR, TS11 8HH.

Stantec has been instructed to complete a Flood Risk Assessment (FRA) and Drainage Strategy (DS) for the partial realignment of the onshore element associated with Teeside A and Sofia Offshore Wind Farm (hereafter referred to as "Sofia"). A Development Consent Order ("DCO") was granted jointly for the Teesside A (TSA) and Teesside B (now renamed Sofia) projects, covering all elements of the wind farms (onshore and offshore), in August 2015. An additional planning consent (under the Town and Country Planning Act (TCPA)) was granted by Redcar and Cleveland Borough Council in April 2016 for realignment of the cable route within the Wilton Works Complex. The centre of the site is located at NGR 460271 (E), 521368 (N), nearest postcode TS11 8HH. A site location plan is enclosed on page 3 of this letter.

The site is shown on the EA's online Flood Map for Planning to be located entirely within Flood Zone 1. Whilst the majority of the proposed cable route is located within areas that have a 'very low' risk of surface water flooding, the cable route does cross areas with a 'low', 'medium' and 'high' risk. The 'low' to 'high' risk areas in particular may be associated with low-lying topography and existing watercourses that cross the site boundary. The cable route outside of the Wilton Works site is generally greenfield and we assume that it currently drains either by infiltration or via the existing network of field drains and ditches.

We are now compiling information and data for use within the Flood Risk Assessment. The assessment of flood risk will consider all potential sources of flooding (fluvial, tidal, surface water, groundwater, surcharging sewers, and other artificial sources). To ensure a comprehensive appraisal of flood risk related constraints we would be grateful if you would provide the following information, where available:

1) Details of any historic flooding in the area of interest (to include written reports, photos, flood extent outlines, duration, return period etc., and commentary on the source/mechanisms of flooding and also including information relating to antecedent conditions and confirmation of the month or season in which they occurred).

2) Details of any flooding/capacity "hot-spots" and potential sources of flooding.

3) Information regarding any remedial works undertaken to alleviate flooding in the area of interest.

4) Details of any flood defences immediately downstream and upstream of the site (e.g. standards of protection, ownership, condition, operational procedures and maintenance arrangements) and confirmation of any risk of defences being outflanked. This should include details of any schemes under consideration.

5) Any information about flood alleviation measures already in place, their state of maintenance and their performance and the current fluvial flood warning system.

6) Details of any culverted watercourses and any other local hydraulic features/controls and hydrological influences within the vicinity of the site that should be considered when undertaking a flood risk assessment (e.g. condition, capacity, ownership, operational procedures and maintenance arrangements).

   We understand that there are potentially two culverted watercourses for which we are unsure of their exact location and condition – see the attached plan on page 4.

7) Confirmation of any design considerations for development of the site e.g. finished floor levels, mitigation measures, access.

8) Details of the setback (easement) from watercourses (both main river and ordinary watercourses) required for developments within this area?

9) Identification of designated 'ordinary watercourses' and other features which would require a land drainage consent, for any works in, over, under or near a watercourse.

10) Details of any flood risk reports undertaken by Redcar and Cleveland Borough Council i.e. Strategic Flood Risk Assessments, Surface Water Management Plans etc.

Groundwater

11) Details of any groundwater source protection zones and the nature of groundwater flow in the vicinity of the site i.e. is the site located on an aquifer? Please provide indicative details of the ground conditions and level of water table if possible.

12) Details of any known groundwater flooding issues.

Surface Water Flooding and Management

13) Details of any known surface water flooding that has occurred within the area of interest (to include date, depth of flooding, duration of flooding, exact location, source mechanism of flooding).

14) Details of any known capacity issues in the local highways drainage or local public surface/foul water sewer systems.

15) Details of key principles for a surface water drainage strategy for any proposed development of the site.

16) Indication of local permeability within the area of interest and suitability of infiltration measures as a means of discharge of surface water from any proposed development (where available).

17) Details of any emerging policy or guidance regarding flood risk or surface water drainage that should be taken into account, particularly with regards to adoption or approval processes, SuDS drainage requirements etc. in your role as Lead Local Flood Authority.

Please provide information for points 1-17 outlined above. We would also ask that you provide contact details and availability for a conference call to discuss the scheme and obtaining all necessary consents and approvals.

Please provide any other details that may be of assistance and of any specific restrictions or constraints that may be applicable to any future proposed development.

Should you wish to discuss any other aspect of the above or any related matters, please feel free to contact me or Ed Turner on 0121 633 2900.

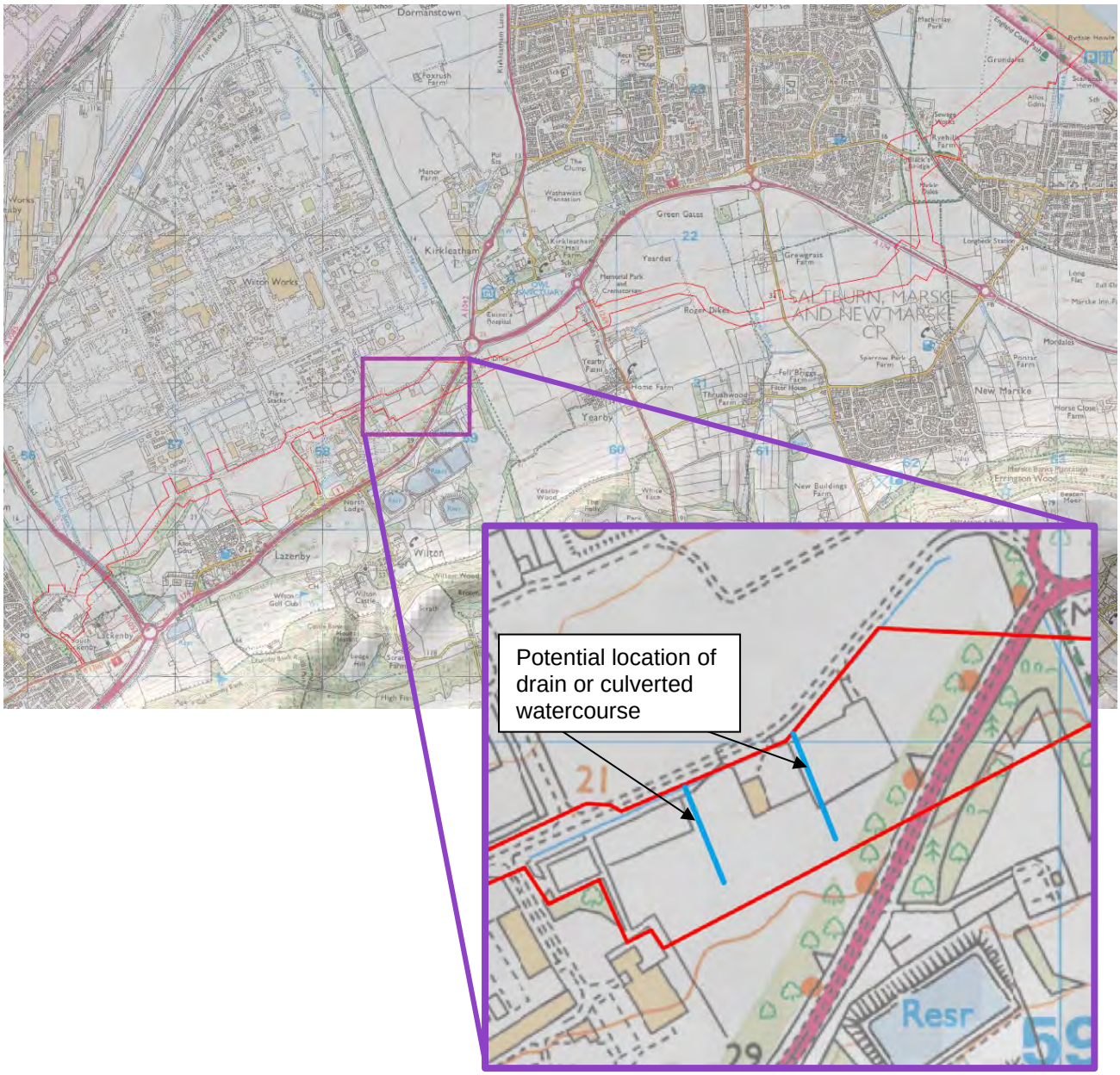
Yours faithfully,

Richard Laker
Senior Engineer Flood Risk and Surface Drainage

For and on behalf of
STANTEC UK LIMITED

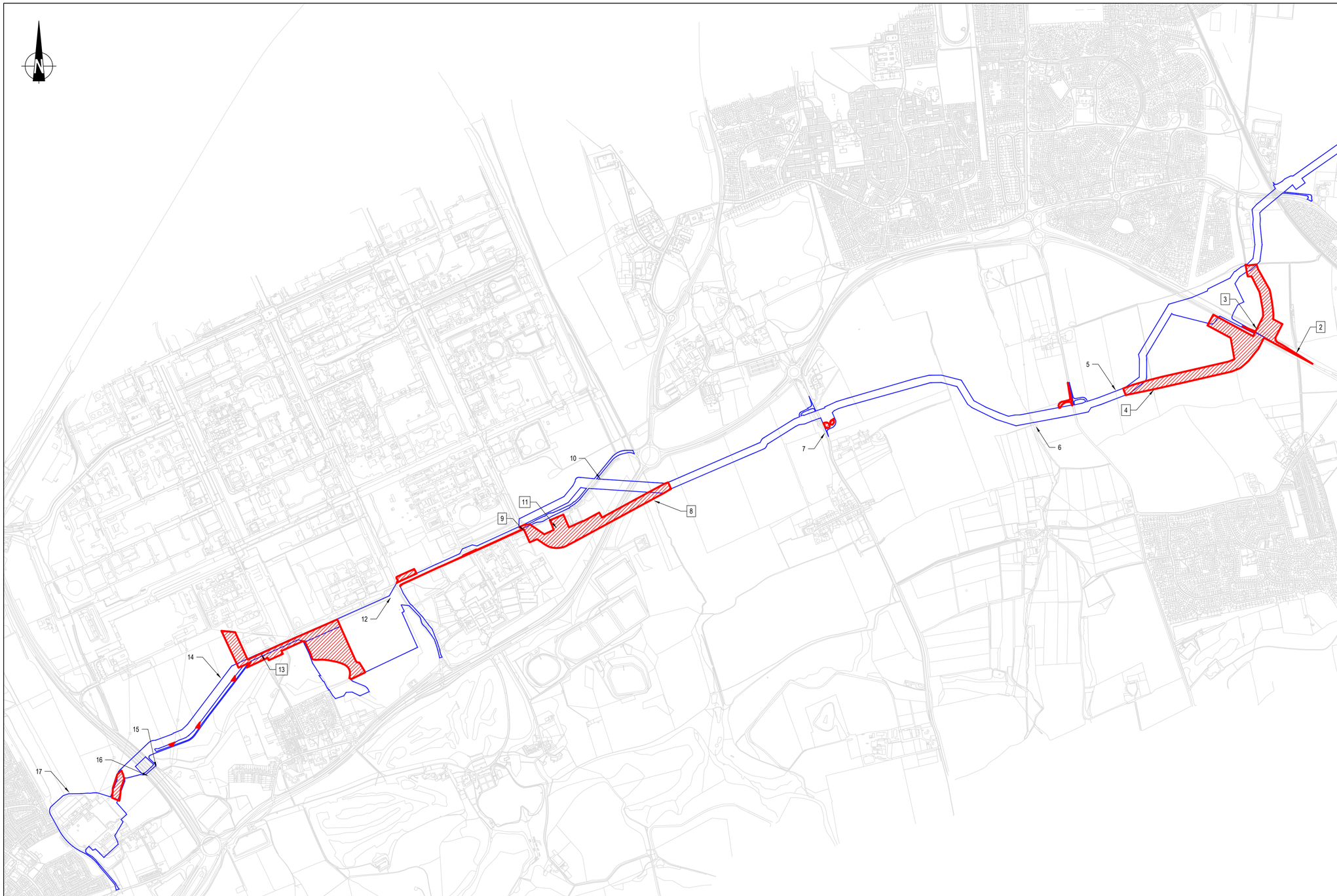
Encs: Site Location Plan

Site Location Plan for TEESIDE A AND SOFIA OFFSHORE WIND FARM, REDCAR, TS11 8HH - NGR 460271 (E), 521368 (N)



Appendix C Stantec Drawings

- Watercourse Crossing Plan - Stantec Drawing No 46941/4002/001



NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ORIGINAL DCO BOUNDARY SHOWN IN BLUE APPROXIMATELY SHOWN FROM DRAWINGS BY FOREWIND DRAWING NUMBER 'F-ONL-MA-803-01'.
4. NEW BOUNDARY IMPORTED FROM 'DOGGERBANK SOFIA FINAL PLANNING APPLICATION BOUNDARY 20200601' GIS SHAPE FILE.

KEY:

- PLANNING APPLICATION BOUNDARY
- DCO LIMITS
- ADDITIONAL AREA

Watercourse Ref/ID (Dwg 46491-4001-001 – included in FRA)	Description	Nature of Works & Area of Works	Anticipated Cable Installation Method
2	Field Drain	Compound	-
	(unnamed)	(Area 1)	
3	Roadside Ditch	Cable Crossing Compound	Trenchless
		(Area 1)	(Horizontal Directional Drilling (HDD))
4	Field Drain	Cable Crossing	HDD or other trenchless method
		(Area 1)	
8	Watercourse (Mains Dike)	Cable Crossing	HDD or other trenchless method
		(Area 3)	
9	Watercourse (unnamed)	Cable Crossing	Culverted
		(Area 3)	
11	Field Drain/Culvert	Cable Crossing Compound	HDD or other trenchless method
		(Area 3)	
13	Watercourse/ Culvert (unnamed)	Cable Crossing	HDD or other trenchless method
		(Area 4)	

Mark	Revision	Date	Drawn	Chkd	Appd
B	TABLE AMENDED. FRAME DETAILS UPDATED	02.07.20	GM	-	-
A	UPDATE TO TABLE	24.06.20	LT	-	-

SCALING NOTE: Do not scale this drawing - any errors or omissions shall be reported to Stantec without delay.

UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

Drawing Issue Status

FOR INFORMATION

DOGGER BANK C/SOFIA ONSHORE WORKS APPLICATION
MARSKE BY THE SEA
INDICATIVE WATER CROSSING PLAN

Client

SOFIA AND DOGGER BANK C

Stantec

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BIRMINGHAM
Tel: 0121 633 2900

Date of 1st Issue	Designed	Drawn
02.06.20	-	UB / LT
A1 Scale	Checked	Approved
1:10000	RL	ET

Drawing Number	Revision
46941/4002/001	B